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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/931,948	08/20/2001	Min-Hao Michael Lu	10052/1601	4671

23838 7590 07/09/2004

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EXAMINER	
HARPER, HOLLY R	

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 07/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Supplemental Office Action Summary	Application N .	Applicant(s)	
	09/931,948	LU ET AL.	
	Examin r	Art Unit	
	Holly R. Harper	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-41 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-9,11-33 and 35-41 is/are rejected.

7)☒ Claim(s) 10 and 34 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 03 October 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Examiner's Notes

Prosecution on case 09/931,948 has been reopened due to the arguments presented during the interview on 6/7/04 with John McGroaty.

Claim Objections

1. Claims 1-23 and 25-41 objected to because of the following informalities: The preamble of the claim mentions a cathode, but the body of the claim has limitations that would be used to create a device. There would not be an organic operative layer in the cathode. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3, 5, 7, 8, 11, 14, and 17-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al.

In regard to claims 1 and 22, the Wakimoto reference discloses a cathode with a hole injecting layer (Figure 3, Element 6b), an organic layer (Figure 3, Elements 5 and 3), and a conducting layer (Figure 3, Element 1). The Wakimoto reference discloses that at least one of the electrodes maybe transparent and made from transparent conductive materials (Column 3, Lines 20-24).

The Wakimoto reference does not appear to disclose the use of an additional transparent conductive material in addition to the conducting layer. The Guha reference teaches that a layer of ITO is formed on top of the conducting layer and helps to provide low series resistance current injection to the active region and act as a protective film (Column 1, Lines 27-50). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a layer of ITO over the conducting layer, as taught by Guha, to act as a protective film.

The Wakimoto reference is silent to the use of an organic buffer layer. The article by Raychuadhuri teaches that a layer of CuPc over the electron transport layer protects the organic layers from being damaged during sputtering deposition of the cathode (Column 1, Lines 46-50). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a buffer layer, as taught by Raychaudhuri, to protect the organic layers.

In regard to claim 3, the Wakimoto reference discloses that the electron injecting layer can be made of Li_2O (Abstract, Line 9-11).

In regard to claim 5, the Wakimoto reference discloses that the electron injecting layer can be made of alkaline metal halides (Abstract, Line 9-11).

In regard to claim 7, the Raychaudhuri reference discloses that the buffer layer is made of CuPc (Column 1, Lines 46-50).

In regard to claim 8, the Raychaudhuri reference discloses that the buffer layer is made of CuPc and can be doped with Li (Page 3, Column 6, Lines 15-19).

In regard to claim 11, the Wakimoto reference discloses that the conducting layer can be made of MgAg (Column 1, Lines 47-50).

In regard to claim 14, the Guha reference discloses that the transparent conductive layer is made of indium tin oxide (Column 1, Lines 39-43).

In regard to claim 17, the Guha reference discloses the use of a transparent conductive layer (Column 1, Lines 39-43). An electrode defined as transparent is considered to be 100% transparent.

In regard to claim 18, it is elementary that mere recitation of a newly discovered function or property, intrinsically possessed by things in the prior art, does not cause a claim drawn to distinguish over the prior art. Additionally, where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an intrinsic characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on. Thus, the functional limitation of claim 18 is taught by Wakimoto in view of Raychaudhuri under intrinsic functional principles.

In regard to claim 19, it is elementary that mere recitation of a newly discovered function or property, intrinsically possessed by things in the prior art, does not cause a claim drawn to distinguish over the prior art. Additionally, where the Patent Office has reason to believe that a

functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an intrinsic characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on. Thus, the functional limitation of claim 19 is taught by Wakimoto in view of Raychaudhuri under intrinsic functional principles.

In regard to claim 20, the Wakimoto reference discloses an electron transport layer (Figure 3, Element 5). It is elementary that mere recitation of a newly discovered function or property, intrinsically possessed by things in the prior art, does not cause a claim drawn to distinguish over the prior art. Additionally, where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an intrinsic characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on. Thus, the functional limitation of claim 20 is taught by Wakimoto in view of Raychaudhuri under intrinsic functional principles.

In regard to claim 21, the Wakimoto reference discloses that the cathode is used in an organic electroluminescent device (Abstract, Line 1).

4. Claims 1, 7, 14, 17-22, 25, 31, 38, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al in view of Forrest (USN 6,548,956).

In regard to claims 1, 22, 25, and 41, the Raychaudhuri reference discloses an organic EL device with a cathode made of Al:Li, an organic EL layer, a buffer layer made of CuPc, and an electron injection layer (Columns 1 and 2). The Raychaudhuri reference does not disclose the

use of a conductive oxide layer on top of the cathode. The Forrest reference teaches that ITO is used on top of the cathode to reduce resistivity (Column 19, Lines 4-6). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a conductive oxide layer on top of the cathode, as taught by Forrest, to reduce resistivity.

In regard to claims 7 and 31, the Raychaudhuri reference discloses that the buffer layer is made of CuPc (Column 2).

In regard to claims 14 and 38, the Forrest reference discloses that the conductive oxide layer is made of ITO (Column 19, Lines 4-6).

In regard to claim 17, the Forrest reference discloses the use of a transparent conductive layer (Column 19, Lines 4-6).

In regard to claim 18, it is elementary that mere recitation of a newly discovered function or property, intrinsically possessed by things in the prior art, does not cause a claim drawn to distinguish over the prior art. Additionally, where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an intrinsic characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on. Thus, the functional limitation of claim 18 is taught by Raychaudhuri in view of Forrest under intrinsic functional principles.

In regard to claim 19, it is elementary that mere recitation of a newly discovered function or property, intrinsically possessed by things in the prior art, does not cause a claim drawn to distinguish over the prior art. Additionally, where the Patent Office has reason to believe that a

functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an intrinsic characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on. Thus, the functional limitation of claim 19 is taught Raychaudhuri in view of Forrest under intrinsic functional principles.

In regard to claim 20, the Raychaudhuri reference discloses an electron transport layer (Column 1). It is elementary that mere recitation of a newly discovered function or property, intrinsically possessed by things in the prior art, does not cause a claim drawn to distinguish over the prior art. Additionally, where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an intrinsic characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on. Thus, the functional limitation of claim 20 is taught by Raychaudhuri in view of Forrest under intrinsic functional principles.

In regard to claim 21, the Raychaudhuri reference discloses that the cathode is used in an organic electroluminescent device (Column 1, Line 1).

5. Claims 1, 3, 5, 7, 8, 11, 14, and 17-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest et al. (USN 6,548,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al.

In regard to claims 1 and 22, the Wakimoto reference discloses a cathode with a hole injecting layer (Figure 3, Element 6b), an organic layer (Figure 3, Elements 5 and 3), and a

conducting layer (Figure 3, Element 1). The Wakimoto reference discloses that at least one of the electrodes may be transparent and made from transparent conductive materials (Column 3, Lines 20-24).

The Wakimoto reference does not appear to disclose the use of an additional transparent conductive material in addition to the conducting layer. The Forrest reference teaches that ITO is used on top of the cathode to reduce resistivity (Column 19, Lines 4-6). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a conductive oxide layer on top of the cathode, as taught by Forrest, to reduce resistivity.

The Wakimoto reference is silent to the use of an organic buffer layer. The article by Raychuadhuri teaches that a layer of CuPc over the electron transport layer protects the organic layers from being damaged during sputtering deposition of the cathode (Column 1, Lines 46-50). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a buffer layer, as taught by Raychaudhuri, to protect the organic layers.

In regard to claim 3, the Wakimoto reference discloses that the electron injecting layer can be made of Li_2O (Abstract, Line 9-11).

In regard to claim 5, the Wakimoto reference discloses that the electron injecting layer can be made of alkaline metal halides (Abstract, Line 9-11).

In regard to claim 7, the Raychaudhuri reference discloses that the buffer layer is made of CuPc (Column 1, Lines 46-50).

In regard to claim 8, the Raychaudhuri reference discloses that the buffer layer is made of CuPc and can be doped with Li (Page 3, Column 6, Lines 15-19).

In regard to claim 11, the Wakimoto reference discloses that the conducting layer can be made of MgAg (Column 1, Lines 47-50).

In regard to claim 14, the Forrest reference discloses that the conductive oxide layer is made of ITO (Column 19, Lines 4-6).

In regard to claim 17, the Forrest reference discloses the use of a transparent conductive layer (Column 19, Lines 4-6).

In regard to claim 18, it is elementary that mere recitation of a newly discovered function or property, intrinsically possessed by things in the prior art, does not cause a claim drawn to distinguish over the prior art. Additionally, where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an intrinsic characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on. Thus, the functional limitation of claim 18 is taught by Wakimoto in view of Raychaudhuri under intrinsic functional principles.

In regard to claim 19, it is elementary that mere recitation of a newly discovered function or property, intrinsically possessed by things in the prior art, does not cause a claim drawn to distinguish over the prior art. Additionally, where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an intrinsic characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the

characteristic relied on. Thus, the functional limitation of claim 19 is taught by Wakimoto in view of Raychaudhuri under intrinsic functional principles.

In regard to claim 20, the Wakimoto reference discloses an electron transport layer (Figure 3, Element 5). It is elementary that mere recitation of a newly discovered function or property, intrinsically possessed by things in the prior art, does not cause a claim drawn to distinguish over the prior art. Additionally, where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an intrinsic characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on. Thus, the functional limitation of claim 20 is taught by Wakimoto in view of Raychaudhuri under intrinsic functional principles.

In regard to claim 21, the Wakimoto reference discloses that the cathode is used in an organic electroluminescent device (Abstract, Line 1).

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Jones et al. (USPN 6,016,033).

The limitations of claim 1 are discussed in the rejection above.

In regard to claim 2, the Wakimoto reference discloses an electron injecting layer, but does not specify that the material used be a layer of LiF on Al. The Jones reference discloses that LiF on Al can be used as an electron injection layer (Column 3, Lines 43-52). Thus, it

would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a layer of LiF on Al, as taught by Jones, as the electron injection layer.

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest (UPSN 6,458,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Jones et al. (USPN 6,016,033).

The limitations of claim 1 are discussed in the rejection above.

In regard to claim 2, the Wakimoto reference discloses an electron injecting layer, but does not specify that the material used be a layer of LiF on Al. The Jones reference discloses that LiF on Al can be used as an electron injection layer (Column 3, Lines 43-52). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a layer of LiF on Al, as taught by Jones, as the electron injection layer.

8. Claims 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Tanaka et al. (USPN 6,107,734).

The limitations of claim 1 are discussed in the rejection above.

In regard to claims 4 and 6, the Wakimoto reference discloses an electron injecting layer, but does not specify that the material used be a layer of CsF or an alkaline metal halide. The Tanaka reference discloses that alkali metal, alkali earth metal, rare earth metals, and a compound containing these metals, including CsF, are the preferable electron injection ability compounds (Column 8, Lines 18-24). Thus, it would have been obvious at the time the

invention was made to a person having ordinary skills in the art to incorporate a layers of CsF, as taught by Tanaka, as the electron injection layer.

9. Claims 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest (USPN 6,458,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Tanaka et al. (USPN 6,107,734).

The limitations of claim 1 are discussed in the rejection above.

In regard to claims 4 and 6, the Wakimoto reference discloses an electron injecting layer, but does not specify that the material used be a layer of CsF or an alkaline metal halide. The Tanaka reference discloses that alkali metal, alkali earth metal, rare earth metals, and a compound containing these metals, including CsF, are the preferable electron injection ability compounds (Column 8, Lines 18-24). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a layers of CsF, as taught by Tanaka, as the electron injection layer.

10. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of "High-efficiency transparent organic light-emitting devices" by Parthasarathy et al.

The limitations of claim 1 are discussed in the rejection above.

In regard to claim 9, the article by Raychuadhuri teaches the use of a layer of CuPc over the electron transport layer protects the organic layers from being damaged during sputtering deposition of the cathode, but it is silent to the use of BCP as a buffer layer. The Parthasarathy

article teaches that CuPc or BCP can be used as a buffer layer in an OLED structure (Page 107, Column 2, Lines 35-39). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a buffer of BCP, as taught by Parthasarathy, in the OLED.

11. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest et al. (USPN 6,548,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of "High-efficiency transparent organic light-emitting devices" by Parthasarathy et al.

The limitations of claim 1 are discussed in the rejection above.

In regard to claim 9, the article by Raychuadhuri teaches the use of a layer of CuPc over the electron transport layer protects the organic layers from being damaged during sputtering deposition of the cathode, but it is silent to the use of BCP as a buffer layer. The Parthasarathy article teaches that CuPc or BCP can be used as a buffer layer in an OLED structure (Page 107, Column 2, Lines 35-39). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a buffer of BCP, as taught by Parthasarathy, in the OLED.

12. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Haight et al. (USPN 5,714,838).

The limitations of claim 1 are discussed in the rejection above.

In regard to claim 12, the Wakimoto and Guha references are silent to the use of a layer of Ca conducting layer below the transparent conductive material. The Haight reference teaches that a thin layer of Ca metal is deposited beneath the ITO layer (Figure 2). The thin layer of Ca forms an effective diffusion barrier and is among the most optically transparent metals (Column 2, Lines 14-25). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a thin layer of Ca beneath the ITO layer, as taught by Haight, to provide an effective diffusion barrier.

13. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest et al. (USPN 6,548,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Haight et al. (USPN 5,714,838).

The limitations of claim 1 are discussed in the rejection above.

In regard to claim 12, the Wakimoto and Forrest references are silent to the use of a layer of Ca conducting layer below the transparent conductive material. The Haight reference teaches that a thin layer of Ca metal is deposited beneath the ITO layer (Figure 2). The thin layer of Ca forms an effective diffusion barrier and is among the most optically transparent metals (Column 2, Lines 14-25). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a thin layer of Ca beneath the ITO layer, as taught by Haight, to provide an effective diffusion barrier.

14. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of "Fabrication of

Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Raychaudhuri et al. (USPN 6,551,752 B2).

The limitations of claim 1 are discussed in the rejection above.

In regard to claim 13, the Wakimoto reference discloses an electron injecting layer, but does not specify that the material used be a layer of LiF and Al. The Raychaudhuri patent discloses that Mg:Ag alloys are used but that LiF/Al contacts also provide efficient electron injection (Column 1, Lines 40-45). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate layers of LiF/Al, as taught by Raychuadhuri, as the electron injection layer.

15. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest et al. (USPN 6,548,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Raychaudhuri et al. (USPN 6,551,752 B2).

The limitations of claim 1 are discussed in the rejection above.

In regard to claim 13, the Wakimoto reference discloses an electron injecting layer, but does not specify that the material used be a layer of LiF and Al. The Raychaudhuri patent discloses that Mg:Ag alloys are used but that LiF/Al contacts also provide efficient electron injection (Column 1, Lines 40-45). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate layers of LiF/Al, as taught by Raychuadhuri, as the electron injection layer.

16. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of

"Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Beck et al. (USPN 6,552,364 B2).

The limitations of claim 1 are discussed in the rejection above.

In regard to claims 15 and 16, the Guha reference discloses the use of ITO but is silent to the use of other conductive oxide layers. The Beck reference teaches that indium tin oxide, zinc indium tin oxide, and aluminum zinc oxide can be used interchangeably (Column 3, Lines 39-45). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate zinc indium tin oxide or aluminum zinc oxide, as taught by Beck, to use as the conductive transparent layer.

17. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest et al. (USPN 6,548,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Beck et al. (USPN 6,552,364 B2).

The limitations of claim 1 are discussed in the rejection above.

In regard to claims 15 and 16, the Forrest reference discloses the use of ITO but is silent to the use of alternative conductive oxide layers. The Beck reference teaches that indium tin oxide, zinc indium tin oxide, and aluminum zinc oxide can be used interchangeably (Column 3, Lines 39-45). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate zinc indium tin oxide or aluminum zinc oxide, as taught by Beck, to use as the conductive transparent layer.

18. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of "Fabrication of

Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Jones et al. (USPN 6,016,033).

In regard to claim 23, the Wakimoto reference discloses a cathode with a hole injecting layer (Figure 3, Element 6b), an organic layer (Figure 3, Elements 5 and 3), and a conducting layer (Figure 3, Element 1). The Wakimoto reference discloses that the conducting layer can be made of MgAg (Column 1, Lines 47-50). The Wakimoto reference discloses that at least one of the electrodes maybe transparent and made from transparent conductive materials (Column 3, Lines 20-24).

The Wakimoto reference discloses an electron injecting layer, but does not specify that the material used be a layer of LiF on Al. The Jones reference discloses that LiF on Al can be used as an electron injection layer (Column 3, Lines 43-52). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a layer of LiF on Al, as taught by Jones, as the electron injection layer.

The Wakimoto reference does not appear to disclose the use of an additional transparent conductive material in addition to the conducting layer. The Guha reference teaches that a layer of ITO is formed on top of the conducting layer and helps to provide low series resistance current injection to the active region and act as a protective film (Column 1, Lines 27-50). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a layer of ITO over the conducting layer, as taught by Guha, to act as a protective film.

The Wakimoto reference is silent to the use of an organic buffer layer. The article by Raychuadhuri teaches that a layer of CuPc over the electron transport layer protects the organic

layers from being damaged during sputtering deposition of the cathode (Column 1, Lines 46-50). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a buffer layer, as taught by Raychaudhuri, to protect the organic layers.

19. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest et al. (USPN 6,548,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Jones et al. (USPN 6,016,033).

In regard to claim 23, the Wakimoto reference discloses a cathode with a hole injecting layer (Figure 3, Element 6b), an organic layer (Figure 3, Elements 5 and 3), and a conducting layer (Figure 3, Element 1). The Wakimoto reference discloses that the conducting layer can be made of MgAg (Column 1, Lines 47-50). The Wakimoto reference discloses that at least one of the electrodes maybe transparent and made from transparent conductive materials (Column 3, Lines 20-24).

The Wakimoto reference discloses an electron injecting layer, but does not specify that the material used be a layer of LiF on Al. The Jones reference discloses that LiF on Al can be used as an electron injection layer (Column 3, Lines 43-52). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a layer of LiF on Al, as taught by Jones, as the electron injection layer.

The Wakimoto reference does not appear to disclose the use of an additional transparent conductive material in addition to the conducting layer. The Forrest reference teaches that ITO is used on top of the cathode to reduce resistivity (Column 19, Lines 4-6). Thus, it would have

been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a conductive oxide layer on top of the cathode, as taught by Forrest, to reduce resistivity.

The Wakimoto reference is silent to the use of an organic buffer layer. The article by Raychuadhuri teaches that a layer of CuPc over the electron transport layer protects the organic layers from being damaged during sputtering deposition of the cathode (Column 1, Lines 46-50). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a buffer layer, as taught by Raychaudhuri, to protect the organic layers.

20. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al.

In regard to claim 24, the Wakimoto reference discloses a device comprising an anode over a substrate (Figure 3, Elements 2 and 7) and a cathode with a hole injecting layer (Figure 3, Element 6b), an organic layer (Figure 3, Elements 5 and 3), and a conducting layer (Figure 3, Element 1). The Wakimoto reference discloses that at least one of the electrodes maybe transparent and made from transparent conductive materials (Column 3, Lines 20-24).

The Wakimoto reference does not appear to disclose the use of an additional transparent conductive material in addition to the conducting layer. The Guha reference teaches that a layer of ITO is formed on top of the conducting layer and helps to provide low series resistance current injection to the active region and act as a protective film (Column 1, Lines 27-50). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills

in the art to incorporate a layer of ITO over the conducting layer, as taught by Guha, to act as a protective film.

The Wakimoto reference is silent to the use of an organic buffer layer. The article by Raychuadhuri teaches that a layer of CuPc over the electron transport layer protects the organic layers from being damaged during sputtering deposition of the cathode (Column 1, Lines 46-50). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a buffer layer, as taught by Raychaudhuri, to protect the organic layers.

21. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest et al. (USPN 6,548,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al.

In regard to claim 24, the Wakimoto reference discloses a device comprising an anode over a substrate (Figure 3, Elements 2 and 7) and a cathode with a hole injecting layer (Figure 3, Element 6b), an organic layer (Figure 3, Elements 5 and 3), and a conducting layer (Figure 3, Element 1). The Wakimoto reference discloses that at least one of the electrodes maybe transparent and made from transparent conductive materials (Column 3, Lines 20-24).

The Wakimoto reference does not appear to disclose the use of an additional transparent conductive material in addition to the conducting layer. The Forrest reference teaches that ITO is used on top of the cathode to reduce resistivity (Column 19, Lines 4-6). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a conductive oxide layer on top of the cathode, as taught by Forrest, to reduce resistivity.

The Wakimoto reference is silent to the use of an organic buffer layer. The article by Raychuadhuri teaches that a layer of CuPc over the electron transport layer protects the organic layers from being damaged during sputtering deposition of the cathode (Column 1, Lines 46-50). Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate a buffer layer, as taught by Raychaudhuri, to protect the organic layers.

22. Claims 25, 27, 29, 31, 32, 35, 38, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al.

In regard to claim 25, the structural limitations are met and rejected in the rejection of claim 1 above.

In regard to claim 27, the structural limitations are met and rejected in the rejection of claim 3 above.

In regard to claim 29, the structural limitations are met and rejected in the rejection of claim 5 above.

In regard to claim 31, the structural limitations are met and rejected in the rejection of claim 7 above.

In regard to claim 32, the structural limitations are met and rejected in the rejection of claim 8 above.

In regard to claim 35, the structural limitations are met and rejected in the rejection of claim 11 above.

In regard to claim 38, the structural limitations are met and rejected in the rejection of claim 14 above.

In regard to claim 41, the structural limitations are met and rejected in the rejection of claim 22 above.

23. Claims 25, 27, 29, 31, 32, 35, 38, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest et al. (USPN 6,548,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al..

In regard to claim 25, the structural limitations are met and rejected in the rejection of claim 1 above.

In regard to claim 27, the structural limitations are met and rejected in the rejection of claim 3 above.

In regard to claim 29, the structural limitations are met and rejected in the rejection of claim 5 above.

In regard to claim 31, the structural limitations are met and rejected in the rejection of claim 7 above.

In regard to claim 32, the structural limitations are met and rejected in the rejection of claim 8 above.

In regard to claim 35, the structural limitations are met and rejected in the rejection of claim 11 above.

In regard to claim 38, the structural limitations are met and rejected in the rejection of claim 14 above.

In regard to claim 41, the structural limitations are met and rejected in the rejection of claim 22 above.

24. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Jones et al. (USPN 6,016,033).

In regard to claim 26, the structural limitations are met and rejected in the rejection of claim 2 above.

25. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest et al. (USPN 6,548,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Jones et al. (USPN 6,016,033)..

In regard to claim 26, the structural limitations are met and rejected in the rejection of claim 2 above.

26. Claims 28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Tanaka et al. (USPN 6,107,734).

In regard to claim 28, the structural limitations are met and rejected in the rejection of claim 4 above.

In regard to claim 30, the structural limitations are met and rejected in the rejection of claim 6 above.

27. Claims 28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest et al. (USPN 6,548,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Tanaka et al. (USPN 6,107,734).

In regard to claim 28, the structural limitations are met and rejected in the rejection of claim 4 above.

28. In regard to claim 30, the structural limitations are met and rejected in the rejection of claim 6 above.

29. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of "High-efficiency transparent organic light-emitting devices" by Parthasarathy et al.

In regard to claim 33, the structural limitations are met and rejected in the rejection of claim 9 above.

30. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest et al. (USPN 6,548,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of "High-efficiency transparent organic light-emitting devices" by Parthasarathy et al.

31. In regard to claim 33, the structural limitations are met and rejected in the rejection of claim 9 above.

32. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Haight et al. (USPN 5,714,838).

In regard to claim 36, the structural limitations are met and rejected in the rejection of claim 12 above.

33. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest et al. (USPN 6,548,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Haight et al. (USPN 5,714,838).

34. In regard to claim 36, the structural limitations are met and rejected in the rejection of claim 12 above.

35. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Raychaudhuri et al. (USPN 6,551,752 B2).

In regard to claim 37, the structural limitations are met and rejected in the rejection of claim 13 above.

36. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest et al. (USPN 6,548,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Raychaudhuri et al. (USPN 6,551,752 B2).

37. In regard to claim 37, the structural limitations are met and rejected in the rejection of claim 13 above.

38. Claims 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Guha et al. (USPN 5,739,545) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Beck et al. (USPN 6,552,364 B2).

In regard to claim 39, the structural limitations are met and rejected in the rejection of claim 15 above.

In regard to claim 40, the structural limitations are met and rejected in the rejection of claim 16 above.

39. Claims 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wakimoto (USPN 5,739,635) in view of Forrest et al. (USPN 6,548,956) in further view of "Fabrication of Lithium-based Alloy Cathodes for Organic Light-Emitting Diodes" by Raychuadhuri et al. in further view of Beck et al. (USPN 6,552,364 B2).

In regard to claim 39, the structural limitations are met and rejected in the rejection of claim 15 above.

40. In regard to claim 40, the structural limitations are met and rejected in the rejection of claim 16 above.

Allowable Subject Matter

41. Claims 10 and 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claims 10 and 34, the references of the Prior Art of record fails to teach or suggest the combination of the limitations as set forth in claim 10, and specifically comprising the limitation of a buffer layer of BCP doped with Li.

Response to Arguments

42. Regarding applicants claim that the combination of Wakimoto in view of Guha in view of Raychaudhuri is improper, the examiner respectfully disagrees. In particular, the applicant points out that there is no motivation to combine Guha and Raychaudhuri. Although the reference of Guha teaches the ITO layer in conjunction with the ZnSe layer, there is nothing in the claim to preclude having two buffer layers. Therefore, the rejection is deemed proper.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Holly Harper whose telephone number is (571) 272-2453. The examiner can normally be reached on Monday-Friday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel, can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Holly Harper
Patent Examiner
Art Unit 2879

7/2/04
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